CLAIMS

What is claimed is:

1. A waterproof digital electronic camera system comprising:

a digital electronic camera having a digital electrical signal interface for downloading image information from the camera;

a converter for converting signals upon the digital electrical signal interface of the camera to radio signals; and

an enclosure hermetically sealing water and air tight both the digital electronic camera and the converter, the enclosure being transparent in at least an area of (i) a lens of the digital electronic camera so that pictures may be taken through the enclosure, and (ii) a radio signal output of the converter so that radio signals containing image information are communicable to regions exterior to the enclosure.

2. The waterproof digital electronic camera system according to claim 1 wherein the converter comprises:

an encoder-decoder for converting electrical signals received upon the digital interface of the electronic camera to further electrical signals that are suitably encoded so as to be converted to radio signals for further transmission;

an antenna; and

an electrical-to-radio signal converter for converting the encoded electrical signals to radio signals, and transmitting the radio signals through the antenna to regions exterior to the enclosure.

3. The waterproof digital electronic camera system according to claim 2

wherein the digital signal interface of the electronic camera produces RS-232 serial digital electrical signals;
and wherein the converter comprises:

an RS-232 to TTL signal converter converting RS-232 serial

digital electrical signals received upon the digital interface of the electronic camera to Transistor-Transistor Logic (TTL) serial digital electrical signals;

an encoder-decoder converting the TTL electrical signals to further electrical signals suitably encoded so as to be converted to radio signals;

an electrical-to-radio signal converter for converting the encoded electrical signals to radio signals, and transmitting the radio signals through the antenna to regions exterior to the enclosure.

4. The waterproof digital electronic camera system according to claim 1 further comprising:

a rechargeable power source for providing power to at least the digital electronic camera; and

a charging circuit, also within the enclosure, for converting some stimuli external to the enclosure into power suitable to recharge the rechargeable power source.

5. The waterproof digital electronic camera system according to claim 4 wherein the rechargeable power source comprises:

a battery.

6. The waterproof digital electronic camera system according to claim 5

wherein the battery is located within a cavity seamlessly sealed to the exterior of the camera in a semi-rigid encapsulant;

wherein the encapsulant may be removed, the battery replaced, and the cavity resealed.

7. The waterproof digital electronic camera system according to claim 4

wherein the enclosure has and presents a blind bore;

and wherein charging circuit comprises:

a ferrite core, external to the enclosure, insertable within the blind bore;

a primary transformer winding around the ferrite core and thus also external to the enclosure; and

a secondary transformer winding within the enclosure in position around the bore;

wherein when the ferrite core is inserted into the hole in the camera then energy may be efficiently coupled from the primary transformer winding to the secondary transformer winding during charging.

8. The waterproof digital electronic camera system according to claim 1 wherein the enclosure comprises:

a potting of the camera and the converter in an optically clear dielectric material.

9. The waterproof digital electronic camera system according to claim 8 wherein the optically clear dielectric potting material is drawn from the group consisting essentially of:

hydrocarbon liquids;

silicone;

epoxy resin; and

clear polymer.

10. The waterproof digital electronic camera system according to claim 1 wherein the digital electronic camera further comprises:

a shutter; and

a shutter circuit for electrically activating the shutter, to which shutter circuit electrical connection may suitably be made; and wherein the waterproof digital electronic camera system further comprises:

a trigger circuit, also within the enclosure and electrically connected to the shutter circuit of the digital electronic camera, responsive to a stimulus external to the enclosure to produce an

electrical signal responsively to which the shutter circuit will electrically activate the shutter of the digital electronic camera.

11. The waterproof digital electronic camera system according to claim 10 wherein the enclosure comprises:

a recess, having two optically transparent opposing walls, into which an opaque object may suitably be temporarily placed so as to disrupt a line-of-sight between the walls;

and wherein the trigger circuit comprises:

an light-emitting device placed behind the transparent area of one opposing wall of the enclosure's recess; and

a photosensor device behind the transparent area of the other opposing wall of the enclosure's recess;

wherein when a obstruction is placed in the recess then a line-of-sight optical link is interrupted which results in the photosensor device sending an electrical signal to the shutter circuit of the digital electronic camera to control the shutter of the digital electronic camera.

12. A method of communicating with a sealed digital electronic camera system comprising:

hermetically housing a digital electronic camera having a digital electrical signal interface for downloading image information from the camera in a housing that is (i) optically transparent in at least an area of a lens of the digital electronic camera so that pictures may be taken through the housing and (ii) transparent to radio:

converting signals upon the digital electrical signal interface of the digital electronic camera to radio signals; and

communicating the radio signals through the housing.

13. The method according to claim 12 used with a digital electronic camera having a digital electrical signal interface wherein the converting is of electrical signals upon the digital electrical

signal interface to modulated radio signals.

14. The method according to claim 13 used with a digital electronic camera having an serial digital electrical signal interface wherein the converting is of serial electrical signals upon the serial digital electrical signal interface to serial radio signals.

15. The method according to claim 14 used with a digital electronic camera having an serial digital electrical signal of a type drawn from the group consisting of

RS-232; and

USB.

16. The method according to claim 13 used with a digital electronic camera having an serial digital electrical signal of the RS-232 type wherein the converting comprises:

first-converting RS-232 serial digital electrical signals to Transistor-Transistor Logic (TTL) serial digital electrical signals in a RS-232 to TTL signal converter;

second-converting the TTL electrical signals to electrical signals suitably encoded so as to be converted to radio signals for further transmission in an encoder-decoder; and

third-converting in an electrical-to-radio signal modulator the encoded electrical signals to radio signals, and transmitting the radio signals through the enclosure.

17. The method according to claim 13 used with a digital electronic camera having both (i) shutter and (ii) other controls wherein the method further comprises:

activating the shutter and other controls of the camera in and by a circuit, located within the enclosure and electrically connected to the digital electronic camera, wirelessly responsive to a stimulus external to the housing;

wherein transmission of the stimulus to the circuit is wireless

without any wires penetrating the enclosure.

18. The method according to claim 117

wherein the activating of the shutter and other controls of the camera is in and by a circuit in form of an mechanical-optical coupling device.

19. A digital electronic camera CHARACTERIZED IN THAT

optics and electronics of the camera are permanently within a solid mass of optically clear dielectric material, and the camera contains essentially no gases whatsoever;

wherein the camera may suitably be immersed to great depth within the ocean without crushing.

20. The digital electronic camera according to claim 19 FURTHER CHARACTERIZED IN THAT

communication of image data from the camera to the exterior of the solid mass is via a radio link.

21. The digital electronic camera according to claim 19 FURTHER CHARACTERIZED IN THAT

communication of an actuation signal to the camera shutter and controls is via an opto-mechanical link.

22. The digital electronic camera according to claim 19 FURTHER CHARACTERIZED IN THAT

the camera is potted in a solid block of epoxy encapsulant.

23. The digital electronic camera according to claim 19 FURTHER CHARACTERIZED IN THAT

the camera is potted in a solid block of silicone encapsulant.

24. The digital electronic camera according to claim 19 FURTHER CHARACTERIZED IN THAT

the camera is potted in a clear semi-rigid block of plastic encapsulant.

25. The digital electronic camera according to claim 19 FURTHER CHARACTERIZED IN THAT

camera electronics and imager are within an optically clear solid encapsulant; but

camera optics are external to the casting and immersed totally in a water environment.